$$T(n) = 3T(n/2) + n^2$$

 $a=3$ $b=2$ $f(n) = n^2$

: a & b are constant and f(n) is a + re function

.. Marteri theorem is applicable

$$C = log_b a$$

= $log_s 3 = 1.58$
» $n^c = n^{1.58}$
which is $n^2 > h^{1.58}$
.: Case 3 is applied here
 $T(n) = \theta(n^2)$

Sol 2.)

$$T(n) = 4T(n/2) + n^2$$

 $a=4$ $b=2$ $f(n) = n^2$

: a ξ b are const. and f(n) is a +re function.

.'. Masters' theorem is applicable.

$$c = \log_{b} a$$

$$= \log_{2} 4 = \log_{2} 2^{2} = 2 \log_{2} 2 = 2$$

$$2) \quad n^{c} = n^{2}$$

$$\text{which is } n^{2} = f(n)$$

$$\therefore \text{ case 2 is applied here}$$

$$\boxed{Tn = \theta \left(n^{2} \log n \right)}$$

$$T(n) = T(n/2) + 2^n$$

 $a=1$ $b=2$ $f(n)=2^n$

: a & b are courst and fin is a + re function f(n)

.. Master's theorem is applicable.

$$C = \log_b a = \log_2 1$$

$$= 0$$

$$\Rightarrow n^c = n^c = 1$$

$$\therefore f(n) > n^c$$

$$\therefore \text{ case 3 is applied here}$$

$$\rightarrow |T(n)=\theta(2^n)|$$

$$\frac{\text{Sol 4.}}{\text{A = 2}^n \text{ b = 2}} \frac{\text{T(n/2)} + \text{n}^n}{\text{position}}$$

: a pare ave not const, its value depends on n : Master's theorem is not applicable here.

Sols:)
$$T(n) = 16 T L^{n}/4$$
) + n

 $a=16$ $b=4$ $f(n)=n$
 $a \notin b$ are coust., and $f(n)$ is $a+re$ f^n

.. Masteis theorem is applicable here,

$$C = \log_{6} a = \log_{4} 16 = \log_{4} (4)^{2}$$

$$= 2 \log_{4} 4 = 2$$

$$\Rightarrow n^{c} = n^{2}$$

$$\therefore f(n) < n^{c}$$

.. Case 1 's applied here,

$$T(n) = \theta(n^2)$$

Sol 6)
$$T(n) = 2T(n/2) + n \log n$$
 $a > 2 \quad b > 7 \quad f(n) = n \log n$
 $a \not\in b \quad ase \quad const \cdot a \quad f(n) \quad is \quad a \quad +ve \quad function$
 $c = \log_b a$
 $-\log_2 2 = 1$
 $n \in n$
 $n < n \log n \Rightarrow f(n) > n^c$
 $n < n \log n \Rightarrow f(n) > n^c$
 $f(n) = \theta (n \log n)$

Sol 7)
$$T(n) = 2T(n/2) + n/\log n$$

$$a \ge 2 \quad b = 2 \quad f(n) = n/\log n$$

$$a \ge b \quad \text{are const. } \notin f(n) \text{ is } a + \text{ve function}$$

$$c = \log_b a$$

$$= \log_2 2 = 1$$

$$N^c = n' = n$$

$$non - \text{polynomial difference } b/\omega f(n) + n^e$$

... Matters theorem is not applicable. $7(n)^{2} 27(n/4) + n^{0.51}$ $a=2 b=4 f(n)=n^{0.5}$

: a & b are conse. & f(n) ie 2 +re function.

: Master's theorem is applicable $c = \log_b a = \log_4 2 = 0.50$ $n = n^{0.50}$ $f(n) > n^{c}$

.. case 3 ie applicable

T(n) = 0 (no.50)

sol 8.)

(4)

SO(9) T(n) = 0.5 p T(n/2) + 1/n a = 0.5 b = 2 f(n) = 1/n a < 1... Masteri theorem is not applicable.

Sol 10.) T(n)=16 T(n/4)+n!

a=16 b=4 f(n)=n! $a \notin b$ are coust and f(n) is a tre function.

? Masteris theorem is applicable

 $c = \log_{6} a$ $= \log_{4} 16 = \log_{4} 4^{2} = 2 \log_{4} 4 = 2$ $n \leq n^{2}$ $f(n) > n^{2}$

: case 3 is applied here

 $\frac{\text{Sol}(11)}{7(n)^2} = 47(n/2) + \log n$ $a = 4 \quad b = 2 \quad f(n) = \log n$

· a & b are constant & f(n) is a +ve fn

.. Masters theorem is applicable

 $c_2 \log_b a_2 \log_2 4_2 \log_2 2^2 = 2\log_2 2^2 = 2$

: f(n) < n c

.. case 1 is applied.

[T(n)= O(n2)

Sol 12) Nh T (n/2)+ logn

a= vn b= 2 f(n)= logn

i a is not constant

.. Marteré theorem is not applicable.

Sel 18)

T(n) = 3 T(n/2) + n

a=3 b=2 f(n)=n

: a & b are const. & f(n) is a +ve fn

.. Marteri theorem is applicable

c= logba= log_3=01.58

n = n1.58

-. f(n) < n c

case 1 is applied here.

T(n) = 0 (n 1.58)

COL 14)

 $T(n) = 3T(n/3) + \sqrt{n}$

a = 3 b = 3 $f(n) = \sqrt{n}$

: a & b are court. & fln) is a tre fr

. Marters theorem is applicable.

c= log a= log 3= 1

n = n1 = n

· · f(n) < n c

.. case 1 is applicable

T(n) > 0(n)

Sol15.)
$$T(n) = 4T(n|2) + c.n$$

 $a = 4$ $b = 2$ $f(n) = c.n$

: a & b are constant & f(n) is a tre fr : Marteri theorem is applicable here.

$$c = \log_b a = \log_2 4 = \log_2 2^2 = 2\log_2 2 = 2$$

$$n^2 = n^2$$

:: f(n) < n;

: Case 1 is applied here

$$\Rightarrow$$
 $[T(n)^2 \theta(n^2)]$

$$T(n) = 3T(n/4) + n \log n$$

 $a = 3$ $b = 4$ $f(n) = n \log n$

" a & b are constant & f(n) is a +ve function

.. Muster's theorem is applicable here.

$$c = \log_b a = \log_4 3 = 0.79$$

$$n^c = n^{0.79}$$

:: f(n) > n c

i. case 3 is applicable here

$$\Rightarrow$$
 $f(n) = \theta (n \log n)$

$$\frac{50(17)}{7(n)} = \frac{37(n/3) + n/2}{4^2 \cdot 3 \cdot 5 + 3 \cdot 5 \cdot (n) = \frac{n}{2}$$

: a & b are count. & f(n) is a + re fr.

.. Master's theorem is applicable here.

:. Case 2 is applied here
$$\Rightarrow [T(n) - n \log n]$$

$$T(n) = 67(n/3) + n^2 \log^n$$

 $a = 6 + b = 3 + f(n) = n^2 \log^n$

a & b are const and f(n) is a +ref"

.. Master's Theorem is applicable here

=> case 3 is applied here

SOL 19.)

$$T(n) = 4T(n/2) + n/\log n$$

 $a = 4$ $b = 2$ $f(n) = n/\log n$

a & b are court and f(n) is a +ve f^n

.. Masteri theorem is applicable here

$$= \log_{1} 2^{2} = 2\log_{1} 2 = 2$$

i. Case 1 is applied here

Sol 20.) $T(n) = 64 T(n/8) \cdot n^2 \log n$ i a & b are const. one f(n) is $a - ve f^n$: Marteir theorem is not applicable.

Sol 21.)

$$T(n) = 7T(n/3) + n^2$$

 $a = 7$ $b = 3$ $f(n) = n^2$

i a, b are const. & f(n) is a +ve fⁿ

i. Master's Theorem is applied here

$$C = \log_{b} a = \log_{3} 7 = 1 - 77$$

$$N^{c} = N^{1.77}$$

: f(n) > m c

... Case 3 is applied here $T(n) = O(n^2)$

Sal 22)

: f(n) is not regular function

: Master's theorem does not be applied here.